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Observed Linkages between the Northern Annular Mode/North Atlantic Oscillation, Cloud Incidence, and Cloud Radiative Forcing

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1. Why decision support services?

The National Oceanic and Atmospheric Administration (NOAA) Next Generation Strategic Plan (2010)¹ identified four societal challenges that have been translated into NOAA long-term goals:

- Climate Adaptation and Mitigation An informed society anticipates and responds to climate and its impacts.
- Weather-Ready Nation Society is prepared for and responds to weather-related events.
- Healthy Oceans Marine fisheries, habitats, and biodiversity are sustained within healthy and productive ecosystems.
- Resilient Coastal Communities and Economies Coastal and Great Lakes communities are environmentally and economically sustainable.

Although climate is a cross-cutting theme in all four societal challenges, the first two most directly address developing NOAA climate information and products that are usable for decision support. For example, NOAA's National Weather Service (NWS) Strategic Plan (2011)² states a goal on enhancing climate service as a part of the Weather-Ready Nation goal. Becoming a Weather-Ready and Climate-Smart Nation implies building community resilience to extreme weather and long-term changes. The critical issue in achieving this goal is a need to move from serving products to serving decision support, i.e. to provide what people really need.

2. Climate-weather linkages

The centerpiece of decision support services includes advancing preparedness and planning for extreme weather and water events that can be achieved through understanding and effective use of information on weather-climate linkages. Climate variability and change often "drive" weather and water events. For example, El Niño/Southern Oscillation impacts temperature and precipitation in many parts of United States. Global climate change impacts the local climate with a recognizable seasonal and spatial variability (Livezey et al., 2007). Understanding local climate drivers of weather and water events as well as ability to incorporate this information in weather forecasting process at local level are critical for developing decision support services.

3. Partnership

Developing background scientific methods for decision support service relies on NWS partnership with NOAA climate research offices, academia, and other partners in climate services such as state climatologists, who may represent either state university or state government institutions. NWS draws on the available scientific expertise and data for understanding climate variability and change impacts on local and regional weather and water elements. Delivery of decision support service depends on extensive network of partners

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¹ NOAA Next Generation Strategic Plan 2010. http://www.ppi.noaa.gov/ngsp/

² NOAA's NWS Strategic Plan 2011. http://www.nws.noaa.gov/sp/

representing local government, emergency managers, natural resources oversight organizations and local communities.

4. Local Climate Analysis Tool (LCAT)

The new Local Climate Analysis Tool (LCAT, Figure 1), introduced in NWS operations in July 2013, highlights the effort to increase effectiveness of climate-related decision support service development and delivery. LCAT provides the most scientifically sound method and data for application in local climate studies. LCAT allows a user to answer questions like: Is the local temperature changing in my town, and how fast does the change occur? What is the relationship between El Niño/Southern Oscillation and precipitation in my town? Does the behavior of drought spell change over time? LCAT is linked from the NOAA climate portal (http://www.climate.gov) or directly at http://nws.weather.gov/lcat/. LCAT can be used for environmental applications, community planning, event preparedness, and natural resource management decisions.



Fig. 1 Functions and features of Local Climate Analysis Tool.

5. Second generation of NWS version of Automated Climate Information System (xmACIS)

The second generation of NWS version of Automated Climate Information System (xmACIS2) has been released in May 2013. The xmACIS2 interface provides near real-time mining of climate data records from the NWS weather observation system, as archived by NOAA National Climate Data Center, and is enhanced with data mining capabilities by the Northeast Regional Climate Center. Compared to the previous version, xmACIS2 includes additional features for multiple station data mining, a larger suite of climate statistics, and new data selection and reporting options. NOAA internal users can access xmACIS2 at http://xmacis.rcc-acis.org/. The public can access xmACIS data information either by using NOAA Online Weather Data (NOWData, Figure 2) at http://www.nws.noaa.gov or by contacting a climate focal point in their local NWS Weather Forecast Office.

6. User support

To enhance climate information application, the NWS tools are enhanced with training modules, consisting of help documentation and dynamic interpretation statements. For example, the LCAT Learn section consists of eleven online audio-visual tutorials covering an introduction to LCAT, background of LCAT data, scientific methodologies recommended for local climate studies, and LCAT applications in NWS climate services operations including decision support service. By developing support features for operational NWS uses, with explanations of the scientific background and best practices for methodology in local climate studies, LCAT enhances our ability to create linkages to climate information in decision support services.

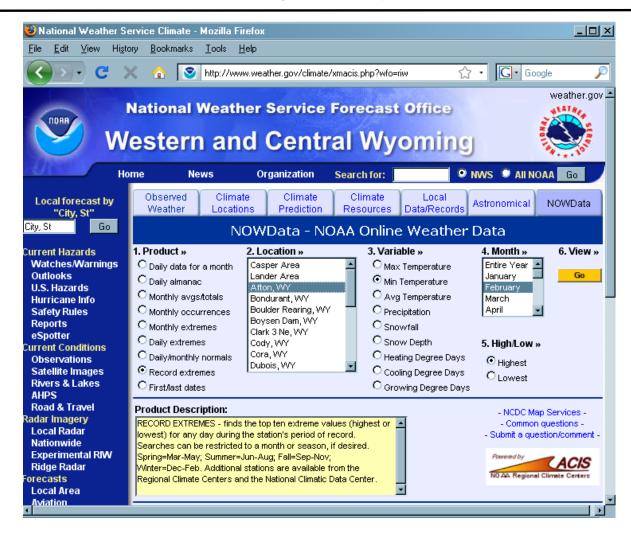


Fig. 2 NOWData features

References

Livezey, R.E., K.Y. Vinnikov, M.M. Timofeyeva, R. Tinker, and H.M. van den Dool, 2007. Estimation and Extrapolation of Climate Normals and Climatic Trends. Journal of Applied Meteorology and Climatology, Vol 46, pp. 1759-1776.